Behold I make all things new

A NEW ELM IS BORN

AUGUSTINE ASCENDING ELM
Trademark REGISTERED

THE AUGUSTINE ASCENDING ELM RESEARCH ASS'N
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SCIENTISTS BELIEVE that a tree is like a machine, the laws for whose operation can be explained by known or knowable laws. Many non-scientists believe that there is more to a tree than an operating machine and that its activities, directed by some unexplained principle of life, cannot ever be completely known or explained. Whatever the viewpoint, all agree that a tree is an extraordinarily efficient organism, manufacturing its own food from raw materials acquired by itself and thus with this food being able to supply the heat and substance necessary for its life, for growth, for the replacement of dead cells, and the healing of injuries caused by forces external to it. What can be said in a short space to describe this organism?

To say as much as is known about a tree would take perhaps a hundred large volumes. And those hundred volumes would not describe it fully, for much about the processes of a tree are unknown. A general description, however, of an idealized tree can be attempted. The best procedure is to follow the fluids in the circulation system to and from the various specialized parts of the tree, describing in turn the function of each part.

Disease of a tree represents disorder and deranged procedure so there is no attempt here to prove disease as resulting from an entity or from a causal agent.

LIFE PROCESSES OF THE TREE

THE THREE PARTS OF A TREE

A tree has three main parts: the roots; the stems (i.e., trunk, branches, twigs); and the leaves. (Most trees also produce flowers and fruits.) Going through all three of these parts is a system of elongated cells called the vascular bundles which connect and carry materials to and from the parts. The vascular system is composed of

three components, the wood or *xylem* which carries the water and soil salts up to the leaves, and the *phloem* which carries the manufactured food and water down to the stems and roots to provide energy for life and growth. In older trees a cambium develops between the *xylem* and *phloem.* This is an embryonic tissue which through division and differentiation of its cells adds internally to the *xylem* and externally to the *phloem* tissues.

THE ROOTS

The function of the roots—other than anchoring the tree—is to absorb water and dissolved salts (nitrates, phosphates and sulphates) from the soil. To better accomplish this the absorbing surface of the root is increased many fold by many small root hairs. The root grows (by a division and differentiation of cells) toward the center of gravity and to sources of water and solubes. Since nearly all natural soils (that is, soils not depleted of salts by successive plantations and removals of dead plant material) have the required mineral salts and since all soils but those in arid regions have moisture, the great root surfaces absorb quantities of water which contains these salts in solution. This solution enters the conductive cells in the *xylem* of the roots and is carried upward through the stem to the leaves.

THE STEM

The stem is composed of *xylem* and *phloem,* the bark or cork which is waterproof to prevent the evaporation of the water from the tissues, and a layer of cells called the *cambium* lying between the *xylem* and *phloem,* and which in the spring and summer produces new cells to increase the size of the roots, trunk, and branches of the tree. Between the vascular bundles are relatively

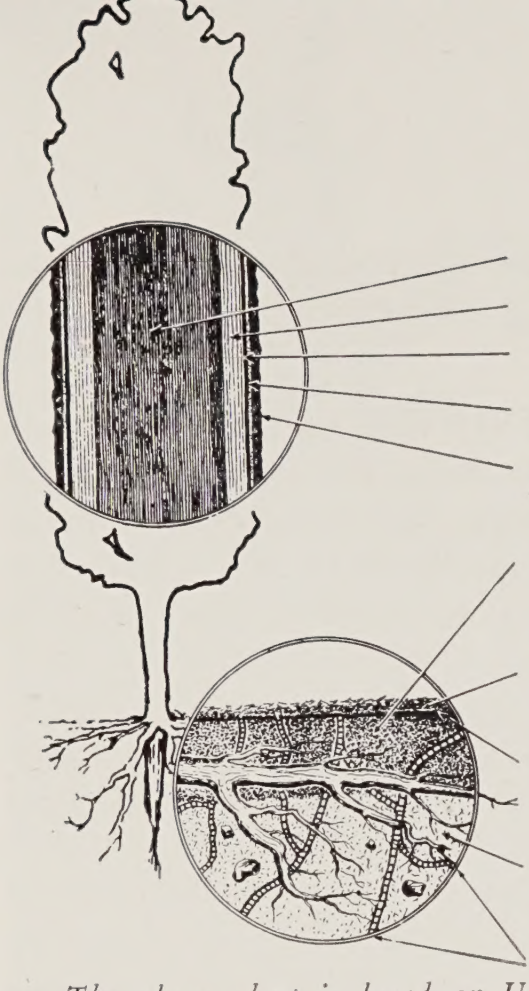
thin walled cells which constitute the pith rays. These function in the lateral conduction of water and solutes. And internal to the bundles is the pith. Thus the trunk and branches of the tree can be thought of as a rigid but growing waterproofed system of pipes, some carrying solutions upward, some downward.

The heart wood of the stem, consisting chiefly of dead cells, commonly makes up the central and by far the greatest portion of older trees. Between this and the cambium lies the sap wood, through which the water and its solutes absorbed by the roots is conducted to the leaves.

THE LEAVES

The outer surfaces of the cells comprising the upper and lower external layers of leaves, the upper and lower epidermis, are commonly covered with a thin waxy substance, the *cutin* layer, which makes the epidermis nearly impermeable to water. In both the upper and lower epidermis, chiefly in the lower, however, minute pores are found. Through these pores gases can enter and escape. Carbon dioxide, necessary for photosynthesis, enters here and diffuses into the chlorophyll containing cells of the leaf mesophyll. Oxygen, required for respiration, also enters. Water can escape as water vapor and oxygen released as a by-product of photosynthesis through these pores.

The solution enters the leaf through the vascular system which extends into it to become the veins of the leaf. In the millions of cells of the many leaves devoted to food manufacture, the water in the presence of chlorophyll is combined with the carbon dioxide through the energy of the sun to produce a kind of sugar called glucose. The manufacture of glucose from water and the carbon dioxide always present in the air goes on



The above chart is based on U. S. Department of Agriculture Soil Service Chart of idealized tree. Buds, root tips, and cambium layer are the growing parts of the tree. Water with minerals is absorbed by the roots, carried via sapwood to the leaves, and combined with carbon from air to make food. This food is carried by the inner bar to all growing parts of the tree, even to root-tips.

in each leaf during the daylight hours from early spring when the leaves appear to late summer or early fall.

THE DISTRIBUTION

The solution of water and this newly manufactured food, glucose, now enters the other components of the vascular system, the phloem tubes. These lie outside the wood and the cambium layer and directly under the non-living bark. Through the phloem the glucose solution is conducted to all other parts of the tree, to newly-forming leaves, to the twigs, the branches, the trunk and the roots. It is used by these parts to provide energy for the continuance of life, to be combined with the soil salts to make new compounds such as fats and proteins, or to be converted into starch.

Some of all of these compounds may be stored away for use during the renewal of growth the following spring.

THE GENEROSITY OF TREES

What does this mean to the average man? It means that a tree is perhaps the most economical thing that a person can invest in. For a tree gives many advantages to a man but takes nothing from him.

WHAT A TREE GIVES

What does a tree give? A tree gives shade in the summer time. The leaves in their function of catching the sunlight to manufacture food, create naturally a green canopy under which different degrees of shade are found. This is a free gift.

A tree or a row of trees offers protection from prevailing winds by shielding a building, a ground or a field by its thick foliage attached to a growing natural support, the trunk and branches. This also is a free gift.

A tree or a row of them, in the same way, creates an obstruction to the sight, thus giving its owner increased privacy. Another free gift.

How much more superior to a stone wall are these values, for a wall of stones does not grow or repair itself as does a wall of foliage.

The strong root system of the tree in its search for water creates meshes to retain the soil and prevent erosion, and this is another gift.

But perhaps the most important service that the tree freely performs is to present its beautiful form, its shimmering leaves, its moving branches to our sight. For there is a feeling and a sentiment in the aspect of a noble and majestic tree that no other object can supply us. And this is a free gift.

Rows of Augustine Ascending Elms in one of the Association's Nurseries.

WHAT A TREE TAKES

All these advantages a tree gives. What does it take from us? We have seen that a tree requires three things: water, soil salts, and sunlight. It requires nothing else. And all these present under all but very unusual conditions, and a tree has all the necessary mechanisms to collect and use them.

After the initial expense and effort of purchasing and planting a tree, usually no further expense or effort is required. The tree searches out its own water and salts without our help. And it gets its energy for the manufacture of food for its growth and life not from man but from the sun. It pushes out its branches and leaves toward

the sun without assistance. It repairs its own wounds by natural coverings. Its roots anchor the tree securely without the help of man. And the strong wood cells in the trunk and branches make a sturdy and flexible branched column which needs no outside support.

THE IDEAL TREE

THE BEST TREE

Everything that has been said is true of trees in general. But what constitutes the best tree? The best tree for planting out is perhaps a strain of a naturally occurring variation that grows uniformly and thrives under conditions similar to those in which a like tree has thrived.

Reproductions from a parent tree are by means of scions, which with tolerance for existing conditions, will almost certainly follow the characteristic appearance of the parent.

ITS FEATURES

Let us proceed according to our divisions of root, stem and leaf. The roots of our ideal tree are strong and deep but are compact so are not likely to clog sewer lines. The roots do not raise the soil around the base of the trunk or grow so close to the surface as to push up and crack nearby cement walks and pavements.

The trunk is strong, and thick enough in proportion to the size of the tree to support it. The crotches of the branches and trunk should be strong enough to withstand very hard wind storms even if the weight of the branches is increased by layers of ice. The distance from the trunk to the tip of the longest branch should not be too great because the downward force exerted on the crotches increases greatly with large overhang.

The leaves should be rough, tough and vigorously green so that they can withstand the attacks

of tree insects. They form on the tree early in the spring and do not fall off until late in the fall. They retain their rich green color during the whole growing season.

Our ideal shade tree should have a form which is pleasing to the eye of the beholder. This is the most difficult of all the ideal tree's attributes to say anything about, for how does one describe the form and structure of a tree that is most likely to please the eye? Better to put it negatively. There should be no ungainly and straggling branches which radically break up the general outline of the tree. Entire branches are not liable to die and cause the tree to be lop-sided or top-heavy.

A NEW ELM TREE IS BORN

ITS HISTORY

A tree new on the American scene called the Augustine Ascending Elm fits our description of the ideal shade tree in every detail and also exhibits some particular advantages. It is a natural mutation (that is, a variation) of the American Elm that was discovered some fifteen years ago in Normal, Illinois. In 1948 an Association was formed to propagate and distribute this new Elm. Because the Augustine Ascending Elm bears no seed, its propagation is accomplished by grafts on American Elm roots. Today it is found in more than 170 urban communities which is important, for six out

Dr. Beal's drawing of chromosomes from root cells of Augustine Ascending Elm.

Three year Augustine As

of every ten people live in the cities of America. Many cities have very large numbers of Augustine Ascending Elms—e.g., New York, Washington, D. C., and Baltimore. These new Elms are widely used by cemeteries and country clubs, and individual property owners have received large numbers through mail order. Because of increasing demand, the Association is presently selecting reputable nurseries throughout the United States to franchise and thus increase the retail distribution of this fine new Elm. The most famous arboretums have specimen scions.

ARCHITECTURAL ADVANTAGES

The advantages which the Augustine Ascending Elm has over and above the features of the

ding Elms in Baltimore.

ideal tree described are: Its small breadth in relation to its height—that is, its narrow columnar form—makes it particularly suited for row planting. The young scions can be planted as close together as 15 feet in order to create in only a few years a thick, strong, rich wall of foliage. Or planted at greater intervals, its repeated upright form makes an ideal avenue of trees.

The branch structure of the Augustine Ascending Elm is unusual. The main branches rise at angles of about 70 to 85 degrees from the horizon. This markedly upslanting branch structure has two very important advantages. First, the downward twisting force on the crotches where the branches join the trunk is very small. Second,

there is no troublesome drip problem, for the water on the leaves runs down the branches to join the trunk and thence courses to the ground.

The rate of growth of the Augustine Ascending Elm is unusually rapid. This makes the tree very economical. Young small-caliper trees sent to the Park Department of Baltimore in 1949 are now from 3 to 4 inches in diameter and thus show an increase in size (i.e., in volume) of 5 to 7 times in three growing seasons!

USES, CLAIMS AND TESTIMONIES

CIVIC

In August, 1952, the Assistant Park Forester of the Department of Recreation and Parks of the beautiful city of Baltimore wrote: *"All in all I can say that this is a very satisfactory tree for street and boulevard planting and I am planning on using more of them this fall where block planting is required."* Baltimore has had very good results by setting $1\frac{1}{4}$ to $1\frac{1}{2}$ inch caliper Augustine Ascending Elms directly out on the parkways.

The Department of Parks of the City of New York, on the other hand, prefers to line out smaller Augustine Ascending Elms to grow them on to a $2\frac{1}{2}$ to 3 inch caliper before transplanting them to the parkways. The Director of Maintenance and Operations of that Department wrote to us in September, 1952, of the first shipment of Augustine Ascending Elms at that time growing in their Ricker's Island Nursery: *"The two hundred trees, 4 to 6 feet in height, purchased in 1949 and planted on December 20, 1949, now average 14 to 16 feet high. The two hundred trees, 6 to 7 feet, purchased last spring and planted April 15, 1952, now measure 8 to 10 feet."*

Ernest H. Wilson, late keeper of Arnold Arboretum of Harvard University, declared that the upright tree forms which are known as fastigiate trees—and rightly spaced and placed, are the most useful trees in garden art and have unusual resistance to plagues.

Chicago Park District supervisor of Landscape Construction was requested to name the best shade and street tree for publication in Chicago Horticulture "Garden Talks." The answer was one of the upright type Elms, and today Horticulture authorities have found in the Augustine Ascending Elm a select strain that is uniform, strong and inspiring.

The lack of overhang, which has been spoken of, assures a free passage of traffic even when the tree is fully matured. An added advantage is that the grass of the parkway receives the light of the sun for some portion of the day and thus can grow right up to the trunk. Since each scion is produced by grafting with carefully controlled wood all ultimately stemming from the parent Augustine Ascending Elm, each will resemble all other specimens so that uniform rows of columnar stately Elms can be obtained by spaced parkway, driveway, or border plantings.

COUNTRY CLUB GROUNDS

Architectural advantages of this controlled, uniform and healthy Elm for golf courses are great. For driveways and approaches to the club house and for borders for the grounds, the remarks above about row-planting apply. This new Elm can be used to particular advantage to line fairway borders because these narrow, upright trees can be planted very close together. Clumps of them can be planted to produce lofty and impressive landmarks and obstacles. They require no

pruning and the leaves stay on until late autumn.

The Greenskeeper of the Rolling Green Golf Club in Saginaw, Michigan, wrote in June, 1952:

> *"I would like to say that the 10 trees all are leafed out very nicely. I am very satisfied with them."*

The Manager of the Flint Golf Club in Flint, Michigan, wrote in August, 1952:

> *"In reply to your letter of August 11, I assure you that we are delighted with the Augustine Ascending Elms we installed two years ago. In total, out of the 212 trees we planted, we have approximately 200 in vigorous growth and fine condition."*

For the first time in the history of the Flint Golf Club, small nursery stock trees were set out directly on the fairways, and through draught and icy storm this hardy new Elm survived and thrived as noted in the excerpt from the letter above.

CEMETERY

Because of its lofty, rising, spire-like form, the Augustine Ascending Elm is suitable for cemetery planting or wherever a spiritual effect is desired in grounds and garden planting. A resident of Fort Madison, Iowa, wrote in August, 1952:

> *"It is still my intention to plant ascending elms on my lot at the cemetery and I will require possibly a dozen trees, and would like them to be equally as large if not a little larger than the ones that you sent me last fall."*

The Managing Director of the Oak Ridge Cemetery in Springfield, Illinois, writes of the Augustine Ascending Elms which are planted near Lincoln's Memorial Tomb there:

Use of Augustine Ascending Elm for close row planting on Unity Farm. Are 12 years old, 30 feet tall and 7 inches in trunk diameter.

"Many thanks. . . . I feel that your organization has done a wonderful piece of work in developing this Elm."

TREE PLAGUE AND PONDERING ON THE TRUTH

ECOLOGY

August P. Beilmann of the Arboretum of the Missouri Botanical Garden very recently stepped back and took a detached and sober view of America and her trees (Arborist's News, October, 1952). He believes that there is no *static* ecological balance ever achieved in nature but that this balance is dynamic, always changing. He applies this principle to American shade trees. He finds

that the present great tree plantations of the Middle West cover areas which were grasslands only 130 years ago and that almost all of the trees planted on the highways, in parks, countryside, streets and yards of America are of the bottomland varieties—elms, sycamores, pin oaks, etc. Consequently, he believes that these bottomland trees *"have been growing on the drier sites for such a short time that we may hardly expect them to be fully adjusted."* He concludes from this that "the ravages of phloem necrosis may be due, in part, to the fact that we have been attempting to use a bottomland tree on what had very recently been grassland and that *"Chestnut Blight and Oak Wilt are merely an expression of incomplete adjustment to a changing environment."* In any estimate of life there are two factors both of which are difficult to judge—the factor of inheritance and the factor of environment. An old adage applies here—*"the boy can be taken from the farm, but the farm can never be taken out of the boy."*

The Augustine Ascending Elm shows a very high resistance to Elm tree diseases. The chief pathologist of the Illinois Natural History Survey Division at the University of Illinois has after three years of attempts succeeded in getting grafts of wood infected with phloem necrosis to *"take"* on some young Augustine Ascending Elms in his greenhouse; the trees continue to live. The same experiment has been performed with Dutch Elm disease in the Park Department of another large city, and the young trees there continue to live. Immunity to disease or to insect pests is not the claim for the Augustine Ascending Elm. *It would seem however, that this new Elm is nature's answer to the challenge of changing environment.*

Five year Augustine Ascending Elms in Baltimore. Pole is 14 feet tall.

These claims are substantiated by the good reports received by the Association from not only professional sources but by the individual owners of this healthy new Elm.

Possibly, then, the so-called elm plagues of recent years are a result of NATURE'S trying to achieve a new ecological balance and that this new balance will be achieved when new strains of trees are evolved which grow well on both high and low water-table ground. The Augustine Ascending Elm, the Association believes, is such a new strain. It is a new strain of the old bottomland American Elm (*it was established as a tetra-*

ploid mutation of American Elm by Dr. J. M. Beal, chairman of the Botany Department of the University of Chicago). And its high resistance to plagues, drought, and its consistently healthy and vigorous habits and growth make it seem that NATURE created this variation to help achieve the ecological balance necessitated by the new tree plantations on former grass lands.

OLD AGE

Gordon S. King, Assistant Professor of Abboriculture at the University of Massachusetts, recently said in an article about the successful program for the control of Dutch Elm Disease on his campus: "*We are continuing to raise elms in our nursery for future planting, because we feel that the elm is here to stay. . . .*" After the original great fear of the elm plagues, many people are coming around to the belief that the "*elm is here to stay!*" These people realize that trees can die of old age. We accept ultimate death in human life. But when an elm tree grows old and dies, most people will find it unusual and begin to search for outside forces that killed it. Many New England elm trees which have been thought to have succumbed in recent years to one of the elm plagues have died rather of old age; and many of the deaths in the Middle West can be attributed to a natural adjustment of an ecological balance.

CEREMONIAL AND DEDICATED TREE PLANTING

Surely there must be a purpose and program in order to plant memorial trees. John Greenleaf Whittier said that "*the wealth, beauty, fertility and healthfulness of the country largely depend upon the conservation of our forests and the planting of trees.*" To impress this truth upon the minds of the young, the Nebraska State Legis-

lature first enacted Arbor Day under the sponsorship of Julius Sterling Morton in 1872; and from which more than a million trees were planted in Nebraska. Since then every state has followed suit in setting aside one day in the year to commemorate the importance of trees to America.

There are further purposes to a day set aside for tree planting ceremonies. One purpose is educational because the occasion can be used to give information about tree planting to the citiens and to acquaint them with the important and very often unrecognized tree planting activities of the local park department.

Another purpose is to provide living and growing, beautiful memorials for the dead, and thus, in Oliver Wendell Holmes' phrase, to *"Make trees monuments of history and character."*

It should be more generally recognized that some types of trees are more durable than marble itself and that a more beautiful, fitting and lasting monument than a carefully-chosen memorial tree or grove of trees cannot be imagined. The Augustine Ascending Elm because of its spiritual, rising form, its great health, its architectural and majestic appearance with youthful masculine strength is particularly suited for dedicated planting.

AUGUSTINE ASCENDING ELM is a natural land planning architectural feature. Counseling is offered for your plantation problem of

Parks — Highways — Streets — Housing Sites — Institutional Grounds — Golf Courses — Cemeteries.

And the Augustine Ascending Elm proves, more than any other shade tree, the general economy and wisdom of planting trees. No other expenditure can better assure a return in practical and esthetic advantage.

"Behold a King shall reign"

The Parent Tree

Located in Normal, Illinois.

Would you like more detailed information about the AUGUSTINE ASCENDING ELM?

Write about your tree problem and your requirements to

THE AUGUSTINE ASCENDING ELM

RESEARCH ASSOCIATION

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